

**REMARKS**

Claims 1-24 are pending in the subject application. The Examiner has rejected claims 1-24 under 35 U.S.C. 103(a).

Applicants have amended claim 1 in order to provide proper antecedent basis for "said reaction chamber" recited in claim 3. Likewise, Applicants have amended claim 14 to recite "said reaction chamber".

Regarding the rejection of claims 1-17, Applicants respectfully submit that the combination of Gupta et al. (U.S. Patent No. 6,020,035) and Singh et al. (U.S. Patent No. 6,776,851) do not teach or suggest Applicants' independent claim 1, or claims dependent thereupon. The combination of Gupta and Singh fail to disclose, teach or suggest Applicants' limitation of "... introducing a species into said reaction chamber that increases the adhesion of said first layer of reaction products to said inner chamber walls." Applicants' invention is directed to increasing the adhesion of reaction products to inner chamber walls, wherein the reaction products are formed from one or more elements of a work piece that is etched in the reaction chamber. As will be discussed in more detail herein below, Gupta discloses forming a seasoning layer over a reaction product which is within inner chamber walls, wherein the reaction product is formed from an etchant gas, not a work piece. Singh discloses removing reaction product from inner surfaces of an etch chamber. Thus, one skilled in the art at the time of the invention would not have found it obvious to modify Gupta in view of Singh since even if Gupta is modified to add the step of "etching a work piece in the etching chamber" as the Examiner states, the combination still does not disclose, teach or suggest increasing the adhesion to the inner chamber walls of reaction products that are formed from one or more elements of a work piece.

Applicants respectfully disagree with the Examiner's characterization of Gupta et al.

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Applicants respectfully submit that Gupta fails to disclose Applicants' limitation of "... the work piece having one or more elements that form a first layer of reaction products ...". Gupta is directed to forming a seasoning layer over a reaction product of an etchant gas in a deposition chamber. Gupta discloses a deposition process in which a deposition step is performed on a wafer; the wafer is removed from the chamber; a chamber clean step using an NF3 etchant gas is performed without the wafer in the chamber to remove deposition material from the chamber surfaces resulting in residual fluorine remaining on the inner chamber surfaces; and the seasoning layer is deposited to "... cover contaminants (e.g. fluorine) that may be absorbed within walls or insulation areas of the chamber interior" (see Abstract). Gupta provides no teaching or suggestion that a wafer is present during the flowing of the NF3 etchant gas in the chamber cleaning step 200, thus, Gupta fails to disclose that the reaction products are formed by one or more elements from the wafer. Rather, Gupta teaches that it is the NF3 etchant gas that is the source of the fluorine reaction product, not the wafer (column 10, lines 59-67).

Also, Gupta fails to disclose that a layer of reaction products is formed that partially adheres to inner chamber walls as claimed by Applicants. Rather, Gupta teaches that the fluorine is "absorbed within" (emphasis added) walls or insulation areas of the chamber (Abstract; column 10, lines 65-67).

Singh is directed to removing reaction products from inner surfaces of an etch chamber. Singh teaches that after a process operation (e.g. etch) is performed on a wafer, the wafer is removed from the etch chamber and an oxygen based cleaning operation is performed to remove silicon residue (i.e. reaction products) from inner surfaces of the chamber (Abstract). Thus, Singh is silent on introducing a species into the etch chamber that increases adhesion of the silicon residue to the inner surfaces of the chamber as claimed by Applicants.

The Examiner relies on the teaching of Singh of "etching a workpiece in an etch

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chamber” to remedy the deficiencies in Gupta. However, Applicants respectfully submit that in addition to failing to disclose “etching a workpiece in the etch chamber”, Gupta also fails to disclose Applicants’ limitation of “... the work piece having one or more elements that form a first layer of reaction products ...”, as discussed hereinabove. . Thus, Singh does not remedy the deficiencies in Gupta and the combination of Gupta and Singh do not teach or suggest Applicants’ claims 1-17.

Regarding claims 18-24, Applicants respectfully submit that the combination of Gupta et al. (U.S. Patent No. 6,020,035), Singh et al. (U.S. Patent No. 6,776,851) and Collins et al. (U.S. Patent No. 6,814,814) do not teach or suggest Applicants’ independent claims 18 or 21, or claims dependent thereupon. As discussed herein above with respect to claims 1-17, the combination of Gupta and Singh fail to disclose, teach or suggest Applicants’ limitation in claim 18 of “... etching the oxide layer, wherein a second layer comprising oxygen forms on the first layer, the second layer increases the adhesion of the first layer to the inner chamber walls” or Applicants’ limitation in claim 21 of “... etching of the oxide component simultaneously provides an oxygen-containing reaction product for increasing the adhesion of said carbon-containing reaction product to the inner chamber walls.” The combination of Gupta and Singh does not disclose, teach or suggest increasing the adhesion to the inner chamber walls of reaction products that are formed from a low-k dielectric layer on a substrate.

The Examiner relies on Collins’ teaching of a cleaning process for a deposition chamber in which silicon is removed from a sacrificial substrate to remedy what the Examiner explicitly states as the failure of Gupta and Singh to disclose providing a second substrate comprising an oxide layer and etching the oxide layer to produce oxygen. Although Collins discloses providing a second substrate to produce silicon, the combination of Gupta, Singh and Collins does not disclose, teach or suggest increasing the adhesion to the inner chamber walls of reaction products that are formed from a low-k dielectric layer on a substrate. Collins discloses that the silicon

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produced from the sacrificial wafer forms on inner chamber walls where it reacts with residual fluorine-containing species to remove the fluorine reaction products from the chamber (see column 5, lines 1-67 to column 6, lines 1-67). Like Gupta, Collins discloses that an NF<sub>3</sub> etchant gas used during a prior chamber cleaning step is the source of the fluorine on the inner chamber walls, not a layer on a substrate. Thus, Collins does not remedy the deficiencies in Gupta and Singh, and the combination of Gupta, Singh and Collins do not teach or suggest Applicants' claims 18-24.

Furthermore, Applicants respectfully disagree with the Examiner's characterization of Gupta in regards to claims 18 and 21. The Examiner states that Gupta discloses a wafer having a low-k dielectric in column 14, lines 33-35. Applicants respectfully submit that Gupta discloses depositing a "USG" (undoped silicate glass) film which is known in the art as a "high-k" dielectric layer, not a low-k dielectric layer. Therefore, Gupta does not disclose providing a substrate having a low-k dielectric layer.

Also, Applicants respectfully disagree with the Examiner's characterization of Singh in regards to claims 18 and 21. The Examiner states that Singh discloses the step of etching a work piece in the etching chamber to form carbon based residue. Applicants respectfully submit that Singh discloses forming a carbon based layer (polymer coating layer 130) on the inner chamber walls by using a CHF<sub>3</sub> plasma fed by a gas feed (column 5, lines 24-27 and column 6, lines 28-30) and does not provide any teaching or suggestion of etching a work piece to form polymer coating layer 130. Therefore, Singh does not disclose etching a portion of a low-k dielectric layer to form a layer comprising carbon on inner chamber walls.

Regarding claims 21-24, Applicants respectfully submit that the Examiner has not provided a proper rejection of these claims. The Examiner states on page 6 of the Office Action dated 04/15/2005 that it is required in claim 21 to provide a second substrate to produce silicon

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and oxygen. Independent claim 21 has no limitation of "a second substrate". Rather, claim 21 is directed to an "oxide component" of the sputter etch chamber which provides an oxygen-containing reaction product. Thus, Applicants believe that the Examiner has not provided any art which discloses the limitations of independent claim 21. Clarification as to the status of claims 21-24 is respectfully requested.

Therefore, Applicants believe that the rejections of the claims under 35 U.S.C. 103(a) have been overcome and it is respectfully requested that the pending claims be passed to issuance in view of the amendments and remarks.

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**CONCLUSION**

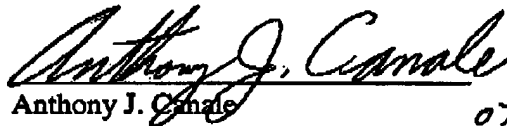
In light of the foregoing remarks, all of the claims now presented are believed to be in condition for allowance, and Applicants respectfully request that the outstanding objections be withdrawn and this application be passed to issue at an early date.

The Examiner is urged to call the undersigned at the number listed below if, in the Examiner's opinion, such a phone conference would aid in furthering the prosecution of this application. No fee is due by virtue of this amendment. However, if the PTO determines that a fee is required, please charge Applicants' Deposit Account, 09-0456.

Respectfully Submitted,

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